The radar team takes time out from construction duties with the Clipperton island inhabitants, red crabs. The team spent more than six weeks in the Pacific installing a temporary radar system to observe the re-entry of the Ariane 5 booster for the French Space Agency. From left are, medic Sgt. Pat Kern, Freeman Bertrand of Lockheed-Martin, survival expert Sgt. "Bunky" Hill, Jeff DeTroye of the Space Science Branch, Greg McCaskill, Greg Sherrill and Bob Simle of Lockheed-Martin.

Photos by Clipperton team

Remote Radar

JSC team goes to extreme ends to conduct science

By Karen Schmidt

Generally, JSC engineers sit at comfortable air-conditioned desks and develop engineering strategies from computers. Last summer, five of these engineers took on the challenge of conducting a radar observation mission with a transportable radar system on a remote atoll in the Pacific.

Instead of air-conditioning, they found 100-degree-plus temperatures. Instead of waxed tile floors, they found a never-ending sea of tiny red crabs at their feet. And instead of using their computer mouse-moving muscles, they found lifting barges and toting bales. In November 1994, the French Space Agency asked NASA to conduct a fully reimbursable project to help track the first stage break up of the newly designed Ariane 5 rocket. Last summer, Jeff DeTroye of the Space Science Branch along with Freeman Bertrand, Greg McCaskill, Greg Sherrill and Bob Simle of Lockheed Martin, spent more than 30 days on Clipperton Island—an uninhabited 3 by 5 kilometer ring-shaped coral atoll 1,600 miles south of San Diego—preparing to track the rocket's first stage re-entry after launch. The engineers also took along survival expert Sgt. Arthur Hill and Independent Duty Medical Corpsman Sgt. Pat Kern from the U.S. Air Force Survival School at Fairchild AFB in Washington.

During the almost seven-week expedition that began April 27, the team endured an eight-day voyage in cramped quarters, a water spout that seemed to make a bee-line for the supply ship and the camp on shore, extreme heat (up to 120 degrees), frequent rain squalls with 30-40 knot winds, and managed to learn to live with the inhabitants of the island—red crabs.

"This island is incredibly remote," DeTroye said. "After the fifth day of the voyage, we didn't see any other ships or aircraft—even on our ship's radar. There are no people on the island, no fresh water, few trees—just a lot of sand. Ships can't get into the lagoon, so the only way on and off the island was through the surf in small rubber boats.

"On the second day on the island a huge water spout (a tornado on the water) came within a half mile of our camp and the boat had to pull anchor and leave us," DeTroye said. "Later that day, looking around at the team, I thought: This is a bunch of office workers and here I was expecting them to literally cart tons of equipment uphill through deep sand in weather worse than Houston in July. The weather guys were warning us that tropical storms could form over us at any time, water spouts seemed to be attracted to our camp, and we had at least four weeks of this to look forward to. I was really proud of they way the team dug in and got the hard, physical work done, overcame the environment, got the radar up, got it operating and then got it all back off the island."

Learning how to work on the island during the 46-day expedition turned out to be one of the more important factors of the mission. Upon arrival at Clipperton, the team spent two days unloading the approximately 14 tons of equipment and camp provisions by barge to the beach.

"The equipment barge was a surplus U. S. Army four-pontoon inflatable bridge," DeTroye said. "The equipment transfer operation was hard physical labor. First, the barge had to be pulled through the surf to the beach. Then every item had to be lifted down from the barge and then carried a minimum of 20-30 yards up a sloped, soft sand beach. By the second day, 'barge ops' was a dirty word around camp."

During the transfer of equipment and while trying to set up camp, daytime temperatures often exceeded 100 degrees. For safety reasons, barge operations had to occur during the day, but part of the team was able to work on the radar at night to avoid the heat until the air-conditioning system was complete in the huts the team constructed. Prior to the mission, the team worked out elaborate plans to keep the island inhabitants, red crabs about the size of a man's hand, away from the radar and power system. The crabs were everywhere on the island and it was thought that they would be able to eat anything.

"The crabs turned out to be not a difficult problem to control." DeTroye said. "The were always under foot, but were not aggressive and could easily be kept out of areas where they were not wanted. After a while we got so used to them that we didn't think twice about going barefoot. They would nibble on your toes though, if you weren't paying attention—like when you were taking a shower."

The periodic heavy surf contributed to the difficult task of transferring equipment and when the weather turned the seas choppy, the support ship could not deliver food, fuel or water to the team. The team ate military rations during these periods.

"At first it was interesting, but after a few days, the MREs really lost their appeal," Detroye said.

Early in the mission, before the storage system was fully set up, water and fuel ran low on the island when the surf made access to the beach from the supply ship impossible.

"Just as in any space mission, preparation and training were the keys to success," DeTroye said. "We had help in getting ready for this mission from people in the Center Operations Directorate, Engineering, Safety, Mission Operations and from all over JSC. We had recognized that moving 28,000 pounds of equipment through the surf in rubber boats was not going to be a trivial task. A group of ex-Navy SEALs taught us how to penetrate the surf and helped work out the barge transfer system. We also had Don Frank, a Lockheed-Martin weatherman, working with the National Hurricane Center evaluating the weather situation for us. Another area we spent quite a lot of time on was medical support. We were a minimum of three days from the nearest hospital, and that was in Mexico. The people here at the JSC Clinic, particularly Dr. Yvonne Cagle and Nurse Lynn Hogan, gave us tremendous support in working out what injuries we should be prepared to treat."

The USAF provided an experienced medic to the team, Sgt. Kern. He quickly gained the confidence of team members and everyone felt comfortable taking problems to him.

"Overall the health of the team was excellent," Detroye said. "Despite the heat, there were no cases of heat exhaustion or significant dehydration."

Set up of camp could not have been accomplished without survival expert "Bunky" Hill. His background in remote deployments, knowledge of camp organization and even simple things like knots made the campsite much more livable.

"Sgts. Hill and Kern probably performed 60 percent of the work in landing the equipment on the beach during the first few days," Detroye said. "They were in far better shape than most of the NASA team and were used to working in the type of remote conditions encountered on the island."

After 28 days on the island, the team had established camp and completed radar setup, two days before the Ariane 501 was scheduled to launch. The team kept close watch on radar and support equipment, but still encountered problems with sand and contaminated fuel for the generators.

With two days left before launch and the work done, the team had a chance to explore the small island. The island is French territory, so there are several memorials to various visits of French warships or French Foreign Legion units. During World War II, there had been a U.S. Navy installation on the island, across the lagoon from the temporary NASA radar site. At some point, the Navy had established a dump of ammunition about 600 yards from the NASA site.

"The ammo was still there," Detroye said. "There were a lot of shells that had obviously self detonated, probably during some storm after the Navy left at the end of World War II—it must have been very exciting for the birds and crabs."

The team spent some of their scarce free time looking for vintage WWII Coca-Cola bottles the Navy had left behind.

On June 4 the French Space Agency launched the Ariane 5 rocket. After about 40 seconds into the flight sequence, the booster veered off, broke up and exploded. An inquiry board would later blame the flight control and guidance systems for the loss of the Ariane 5.

"The French Space Agency felt pretty bad that we had spent a month on Clipperton getting ready for the observation and it all came to nothing," Detroye said. "They made it pretty clear to us that they really appreciated our efforts."

It took only two days to pack up equipment, transfer it back to the ship, clean up the camp and weigh anchor back to San Diego.

"We were very motivated to get off the island and on our way back home," Detroye said.

After 46 days away from the American coast, the crew returned to San Diego on June 11 with a stack of lessons learned for the next transportable radar system mission.

"While no data was collected due to the Ariane 5 failure, the NASA campaign was a complete success," Detroye said. "The radar and all its associated equipment was operational on launch day, no one was seriously hurt, and all the radar equipment was returned to JSC without significant damage."

The French Space Agency has recently asked NASA to arrange an observation of the reentry of the first stage of the next Ariane 5 mission. "Unfortunately the trajectory is different, so we won't be going back to Clipperton" DeTroye said with a smile. ❑

Center left, from left, McCaskill and Hill build one of the three radar antennas. Each antenna was mounted on its own concrete base and precisely aligned to observe a selected portion of the horizon. Center right, from left, Hill and Bertrand perform maintenance on the messenger line that carried supplies from the supply ship to the island team. The messenger was used to pull the barge to and from the beach. Bottom, Hill assists Sherrill in final adjustments of the radar antenna elements, that bears a NASA flag, just prior to launch of the booster. The team also raised the European Space Agency and French Space Agency flags in support of the mission. Clipperton Island is an atoll with a lagoon of brackish water and green slime. In the distance is a clump of tress where the team found remains of a World War II U. S. Navy camp.